

REMARKS**II. Status of the Claims**

Claims 1-38 are pending. Claims 1-3 are allowed. Applicant is gratified that original claims 1-3 are allowed and patentable over the art.

A Supplemental Response to Office Action was filed (by facsimile) on September 11, 2002 and to correct a minor error in format of the amended claims, a Substitute Supplemental Response to Office Action was filed (by facsimile) on September 17, 2002. In such response, claims 20 and 26 were cancelled without prejudice to Applicant's right to pursue the subject matter of those claims in continuation, reissue, reexamination or other applications related or unrelated to this application. As discussed with Examiner Norman at the Office interview on September 5, 2002, all other reissue claims, i.e., claims 4-19, 21-25 and 27-38 are believed to be allowable.

Notwithstanding their allowability, each of the independent claims 4, 9, 14, 17, 24, 29, 33 and 35 has been further amended above to more particularly point out and distinctly define the distinction of the claimed subject matter over the art of record. Support for the amendments to the claims may be found throughout the specification, claims, abstract and figure as originally filed, and tables that recite support for each claim element can be found in Attachment B to this paper.

Support for the claim language added by the forgoing amendments, i.e., language regarding the suction line valve "being cyclable between open and closed positions, the suction line valve in the closed position in normal operation preventing refrigeration fluid flow to the compressor other than optionally permitting a limited flow through the suction line valve to prevent vacuum pump operation" can be found for example, at column 2, lines 32-48. At column 2, lines 32-37, the specification states that there is a suction line valve in the suction line from the evaporator to the compressor:

The liquid-vapor mixture of refrigerant is supplied to evaporator 22 where the liquid refrigerant evaporates to cool the required space and the resultant gaseous refrigerant is supplied to compressor 12 via suction line 24 containing solenoid valve 54 to complete the cycle.

The specification goes on to disclose at Column 2, lines 39-48, that the suction line valve (solenoid valve 54 in the text quoted immediately above) cycles between open and closed positions to modulate compressor capacity, and in its closed position prevents refrigerant fluid flow to the compressor other than optionally permitting limited flow to prevent vacuum pump operation:

Pursuant to the teachings of the present invention solenoid valve 54 can be rapidly pulsed to control the capacity of compressor 12. Since the pulsing will be more rapid than the response time of the system 10, the system 10 responds as though the valve 54 is partially open rather than being cycled between its open and closed positions. Modulation is achieved by controlling the percentage of the time that valve 54 is on and off. To prevent a vacuum pump operation, the "off" position of valve 54 may need to permit a limited flow.

As seen in the sole figure of the '334 reissue application, the suction line valve controls the entire flow to the compressor during modulation. That is, when the suction line valve is closed, there can be no flow to the compressor (other than the limited flow to prevent vacuum pump operation). In this regard, the specification teaches that in normal operation during such modulation of the compressor by operation of the suction line valve (again, valve 54 in the figure), nearby bypass line valve 52 and economizer flow line valve 56 are closed. See Column 2, lines 26-27.

Thus, under normal operating conditions, fluid flow is prevented from flowing to the compressor when the valve is in its closed position, and fluid flows to the compressor when the valve is in its open position. Modulation of the compressor capacity is achieved by cycling the suction line valve between open and closed positions using a cycling time shorter than the response time of the system.

Applicant respectfully requests reconsideration and allowance of the claims.

III. Application is in Condition for Allowance

The amendments presented above are believed to be consistent with the points developed during the interview and are believed to put the application into better

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condition for immediate allowance. In particular, the claims as originally presented and as now presented are patentable over the art of record. Kountz does not teach or suggest any particular time constant or response time for its system. This aspect of the system is not discussed in Kountz. Further, Kountz does not teach or suggest any suction line valve that regulates the entire refrigerant flow to the compressor, i.e., a valve that in the closed position in normal operation prevents refrigeration fluid flow to the compressor (other than optionally permitting a limited flow through the suction line valve to prevent vacuum pump operation).

Instead, the stroke control valve 21 of Kountz is in line 22 and therefore is not operative, in normal operation, to prevent refrigeration fluid flow to the compressor, as that phrase is used in the present application. See refrigerant supply line (unnumbered) from evaporator 15 to compressor 10 in Fig. 1 of Kountz.

For any of these reasons Kountz is clearly seen to fall well short of teaching or suggesting the air conditioning or refrigeration systems or compressors or methods of the present claims.

IV. Additional Papers to be Filed

Patentee will be filing additional papers including: (i) Supplemental Request for Interference under 37 C.F.R. § 1.607; and (ii) an Information Disclosure Statement.

The Supplemental Request for Interference under 37 C.F.R. § 1.607 is being filed to assist the Examiner in declaring an interference between the claims of the instant reissue application and the claims of U.S. Patent No. 6,206,652, which are directed to the same inventive concept.

The Information Disclosure Statement is being filed for completeness of the record to cite other patents, none of which are seen to disclose, teach or suggest a refrigeration system which includes a suction line valve, in the refrigeration fluid suction line, being cyclable between open and closed positions, the suction line valve in the closed position in normal operation preventing refrigeration fluid flow to the compressor other than optionally permitting a limited refrigeration fluid flow through the suction line valve to prevent vacuum pump operation, the suction line valve operative to cycle with a

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cycling time shorter than the response time of the system to modulate compressor capacity. For the Examiner's convenience, a copy of PTO Form 1449 of the IDS is included as an attachment (Attachment C) to this paper.

V. Conclusion

Applicant respectfully requests allowance of the claims pending in the application and declaration of interference with US patent 6,206,652.

Respectfully submitted,
Lifson, A.

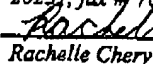


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CERTIFICATE OF FACSIMILE

I hereby certify that this correspondence is being faxed to
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Commissioner for Patents, Box REISSUE, Washington, D.C.
20231, fax # 703-872-9302 on 8-Oct-02.


Rachelle Chery

8-Oct-02
Date

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Lifson, A. **Group Art Unit:** 3744
Serial No.: 09/921,334 **Examiner:** Norman, Marc E.
Filed: August 03, 2001
For: PULSED FLOW FOR CAPACITY CONTROL
Original Filing Date: December 8, 1997
Original Patent No: 6,047,556
Granted: April 11, 2000

ATTACHMENT A
VERSION SHOWING CHANGES MADE

The following changes were made, relative to the Substitute Supplemental Response to the Office Action faxed on September 17, 2002, to the indicated claims in the paper to which this Appendix is appended. Underlined text is added. Text with strike-through is deleted.

In the Claims

Claim 4. (Twice Amended) An air conditioning or refrigeration system comprising:
an evaporator;
a compressor ~~having a refrigeration fluid suction port and a refrigeration fluid discharge port;~~
a refrigeration fluid suction line from the evaporator to the compressor; and
a suction line valve, in the refrigeration fluid suction line, being cyclable between open and closed positions, the suction line valve in the closed position in normal operation preventing refrigeration fluid flow to the compressor other than optionally permitting a limited refrigeration fluid flow through the suction line valve to prevent vacuum pump operation.

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~~the suction line valve, in fluid communication with the compressor, operative to cycle with a cycling time shorter than the response time of the system to control fluid flow to the compressor to modulate compressor capacity.~~

Claim 9. (Twice Amended) An air conditioning or refrigeration system comprising:

an evaporator;

~~a compressor having a refrigeration fluid suction port and a refrigeration fluid discharge port, being operative to compress refrigeration fluid received via the suction port and discharged via the discharge port;~~

a refrigerant fluid suctionflow line from the evaporator to the compressor,
the refrigeration fluid suction line operative to carry refrigeration fluid from the evaporator to and in fluid communication with the compressor;

a capacity controller operative to generate a control signal corresponding to desired capacity modulation; and

a suction line valve, in the refrigerant fluid suctionflow line, which is
~~operative~~ is operatively connected to the controller to receive capacity control
signals from the controller and being cyclable between open and closed positions,
the suction line valve in the closed position in normal operation preventing
refrigeration fluid flow to the compressor other than optionally permitting a
limited flow through the suction line valve to prevent vacuum pump operation,
the suction line valve operative in response to capacity control signals received from the controller to cycle with a cycling time shorter than the response time of the system to ~~control fluid flow to the compressor~~ to modulate compressor capacity.

Claim 14. (Twice Amended) An air conditioning or refrigeration system comprising:

an evaporator;

~~a compressor having a refrigeration fluid suction port and a refrigeration fluid discharge port, being operative to compress refrigeration fluid received via the suction port and discharged via the discharge port;~~

a refrigerant fluid suctionflow line from the evaporator to the compressor, the refrigeration fluid suction line operative to carry refrigeration fluid from the evaporator to the compressor and in fluid communication with the compressor;

a capacity controller operative to generate a control signal corresponding to desired capacity modulation; and

a solenoid valve, in the refrigerant fluid suctionflow line, which is operatively connected to the controller to receive capacity control signals from the controller and being cyclable between open and closed positions, the solenoid valve in the closed position in normal operation preventing refrigeration fluid flow to the compressor other than optionally permitting a limited flow through the solenoid valve to prevent vacuum pump operation,

the solenoid valve operative in response to capacity control signals received from the controller to cycle between a fully open position and a fully closed position to control fluid flow to the compressor to modulate compressor capacity.

Claim 17. (Twice Amended) A capacity modulated compressor for an air conditioning or refrigeration system ~~having a refrigerant flow line~~, comprising:

a compressor housing comprising a compression chamber, a refrigeration fluid suction line at least one refrigerant injection port operative to pass refrigerant to the compression chamber, and at least one refrigerant discharge line port operative to pass compressed refrigerant from the compression chamber;

a capacity controller operative to generate a control signal corresponding to desired capacity modulation; and

a suction line valve, in the refrigeration fluid suction line, operatively connected to the controller to receive capacity control signals from the controller and being cyclable between open and closed positions, the suction line valve in the closed position in normal operation preventing refrigeration fluid flow to the

compression chamber other than optionally permitting a limited flow through the suction line valve to prevent vacuum pump operation
the suction line valve operative in response to capacity control signals received from the controller to cycle with a cycling time shorter than the response time of the system to ~~control fluid flow to the compressor~~ to modulate compressor capacity.

Claim 24. (Twice Amended) A capacity modulated compressor for an air conditioning or refrigeration system ~~having a refrigerant flow line~~, comprising:

a compressor housing comprising a compression chamber, at least one refrigerant suction line ~~injection port~~ operative to pass refrigerant to the compression chamber, and at least one refrigerant discharge line~~port~~ operative to pass compressed refrigerant from the compression chamber;

a capacity controller operative to generate a control signal corresponding to desired capacity modulation; and

a solenoid valve, in the refrigeration fluid suction line, operatively connected to the controller to receive capacity control signals from the controller and being cyclable between open and closed positions, the solenoid valve in the closed position in normal operation preventing refrigeration fluid flow to the compression chamber other than optionally permitting a limited refrigeration fluid flow through the solenoid valve to prevent vacuum pump operation,
the solenoid valve operative in response to capacity control signals received from the controller to cycle between a fully open position and a fully closed position ~~to control fluid flow to the compressor~~ to modulate compressor capacity.

Claim 29. (Twice Amended) A capacity modulated compressor comprising:

a compressor having a refrigeration fluid suction line~~inlet~~ for supplying refrigeration fluid~~suction gas~~ to the compressor;

a suction line valve provided in the suction gas flow line~~path~~ to the compressor, the suction line valve being operable between open and closed positions to cyclically allow and prevent flow of refrigeration fluid~~suction gas~~

into the compressor, the suction line valve in the closed position in normal operation preventing refrigeration fluid flow to the compression chamber other than optionally permitting a limited refrigeration fluid flow through the suction line valve to prevent vacuum pump operation;

a controller for actuating the suction line valve between the open and closed positions, the controller being operative to cycle the suction line valve such that its cycle time is shorter than the response time of the system ~~to control fluid flow to the compressor~~ to modulate compressor capacity.

Claim 33. (Twice Amended) A method of modulating the capacity of a compressor in an air conditioning or refrigeration system, comprising cycling a suction line valve, in fluid communication with the compressor, using a cycle time shorter than the response time of the system to modulate compressor capacity, and the suction line valve being operable between open and closed positions to cyclically allow and prevent flow of refrigeration fluid into the compressor, the suction line valve in the closed position in normal operation preventing refrigeration fluid flow to the compression chamber other than optionally permitting a limited refrigeration fluid flow through the suction line valve to prevent vacuum pump operation ~~using a cycle time shorter than the response time of the system to control fluid flow to the compressor to modulate compressor capacity.~~

Claim 35. (Twice Amended) A method of modulating the capacity of a compressor in a closed refrigerant circulating system, said compressor comprising a compression chamber ~~having a port in fluid communication with~~ connected to a refrigerant suction line of the system through which refrigerant fluid is supplied to the compression chamber, comprising:

rapidly cycling a solenoid valve, disposed in the refrigerant suction line upstream of said compression chamber, ~~port~~ between its fully open position and its fully closed position ~~to control fluid flow to the compressor~~ to modulate compressor capacity, the solenoid valve in the closed position in normal operation

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preventing refrigeration fluid flow to the compression chamber other than optionally permitting a limited refrigeration fluid flow through the solenoid valve to prevent vacuum pump operation.

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Claim Language

Claim 4. An air conditioning or refrigeration system comprising:

an evaporator;

a compressor;

a refrigeration fluid suction line from the evaporator to the compressor; and

a suction line valve, in the refrigeration fluid suction line

being cyclable between open and closed positions,

the suction line valve in the closed position in normal operation preventing refrigeration fluid flow to the compressor

other than optionally permitting a limited refrigeration fluid flow through the suction line valve to prevent vacuum pump operation.

the suction line valve operative to cycle with a cycling time shorter than the response time of the system to modulate compressor capacity.

Supporting Language in the Specification

See Abstract and Figure

See evaporator 22 in the Figure

See compressor 12 in the Figure

See line 24 in the Figure

See valve 54 in the Figure

See Column 2, lines 41-45

See Column 2, lines 32-37

See Column 2, lines 46-48

See Column 1, lines 32-35

Attachment B

Claim Language

Claim 9. An air conditioning or refrigeration system comprising:

an evaporator;

a compressor;

a refrigeration fluid suction line from the evaporator to the compressor

the refrigeration fluid suction line operative

to carry refrigeration fluid from the evaporator to the compressor

a capacity controller operative to generate

a control signal corresponding to desired capacity modulation; and

a suction line valve, in the refrigeration fluid suction line,

operatively connected to the controller to receive

capacity control signals from the controller and

being cyclable between open and closed positions

the suction line valve in the closed position in normal operation

preventing refrigeration fluid flow to the compressor

other than optionally permitting a limited refrigeration

fluid flow through the suction line valve to prevent vacuum pump operation,

the suction line valve operative in response

to capacity control signals received from the controller

to cycle with a cycling time shorter than the response time

of the system to modulate compressor capacity.

Supporting Language in the Specification

See Abstract and Figure

See evaporator 22 in the Figure

See compressor 12 in the Figure

See line 24 in the Figure

See Column 2, lines 32-37

See Figure; Column 2, lines 22-25

See valve 54 in the Figure

See Figure; Column 2, lines 22-25

See Column 2, lines 41-45

See Column 2, lines 32-37

See Column 2, lines 46-48

See Column 1, lines 32-35; Column 2, lines 26-48

See Column 1, lines 32-35

Attachment B (cont.)

Claim LanguageSupporting Language in the Specification

Claim 14. An air conditioning or refrigeration system comprising

See Abstract and Figure

an evaporator;

See evaporator 22 in the Figure

a compressor;

See compressor 12 in the Figure

a refrigeration fluid suction line from the evaporator to the compressor

See line 24 in the Figure

the refrigeration fluid suction line operative

See Column 2, lines 32-37

to carry refrigeration fluid from the evaporator to the compressor;

a capacity controller operative to generate

See Figure; Column 2, lines 22-25

a control signal corresponding to desired capacity modulation; and

a solenoid valve, in the refrigeration fluid suction line,

See valve 54 in the Figure; Column 1, lines 27-30

operatively connected to the controller to receive

See Figure; Column 2, lines 22-25

capacity control signals from the controller and

being cyclable between open and closed positions,

See Column 2, lines 41-45

the solenoid valve in the closed position in normal operation preventing refrigeration fluid flow to the compressor

See Column 1, lines 27-30; Column 2, lines 32-37

other than optionally permitting a limited flow through the solenoid valve to prevent vacuum pump operation,

See Column 2, lines 46-48

the solenoid valve operative in response to capacity control signals received from the controller to cycle

See Column 1, lines 32-35; Column 2, lines 26-48

between a fully open position and a fully closed position to modulate compressor capacity.

See Column 1, lines 25-27

Attachment B (cont.)

Claim Language

Claim 17. A capacity modulated compressor for an air conditioning or refrigeration system comprising:

a compressor housing comprising a compression chamber, a refrigeration fluid suction line operative to pass refrigerant to the compression chamber and at least one refrigerant discharge line operative to pass compressed refrigerant from the compression chamber; a capacity controller operative to generate a control signal corresponding to desired capacity modulation; and a suction line valve, in the refrigeration fluid suction line, operatively connected to the controller to receive capacity control signals from the controller and being cyclable between open and closed positions, the suction line valve in the closed position in normal operation preventing refrigeration fluid flow to the compressor other than optionally permitting a limited flow through the suction line valve to prevent vacuum pump operation. the suction line valve operative in response to capacity control signals received from the controller to cycle with a cycling time shorter than the response time of the system to modulate compressor capacity.

Supporting Language in the Specification

See Figure; Column 1, line 65 to Column 2, line 48

See Figure; Column 2, lines 32-37

See Figure; Column 1, lines 27-30

See line 14 in the Figure; Column 2, lines 26-37

See Figure; Column 2, lines 22-25

See valve 54 in the Figure; Column 1 lines 27-30

See Figure; Column 2, lines 22-25

See Column 2, lines 41-45

Column 2, lines 32-37

See Column 2, lines 46-48

See Column 2, lines 26-48

See Column 1, lines 32-35

Attachment B (cont.)

Claim Language

Claim 24. A capacity modulated compressor for an air conditioning or refrigeration system comprising:

a compressor housing comprising a compression chamber

at least one refrigerant suction line operative to pass refrigerant to the compression chamber, and

at least one refrigerant discharge line operative to pass compressed refrigerant from the compression chamber;

a capacity controller operative to generate a control signal corresponding to desired capacity modulation; and

a solenoid valve, in the refrigeration fluid suction line,

operatively connected to the controller to receive capacity control signals from the controller and

being cyclable between open and closed positions,

the solenoid valve in the closed position in normal operation preventing refrigeration fluid flow to the compressor

other than optionally permitting a limited flow through the solenoid valve to prevent vacuum pump operation,

the solenoid valve operative in response to capacity control signals signals received from the controller

to cycle between a fully open position and a fully closed position to modulate compressor capacity.

Supporting Language in the Specification

See Figure; Column 1, line 65 to Column 2, line 48

See Figure; Column 2, lines 32-37

See Figure; Column 1, lines 27-30

See line 14 in the Figure; Column 2, lines 26-37

See Figure; Column 2, lines 22-25

See valve 54 in Figure; Column 1, lines 25-30

See Figure; Column 2, lines 22-25

See Column 2, lines 41-45

See Column 2, lines 32-37

See Column 2, lines 46-48

See Column 2, lines 26-48

See Column 1, lines 25-27

Attachment B (cont.)

Claim Language

Claim 29. A capacity modulated compressor comprising:

a compressor having a refrigeration fluid suction line for supplying refrigeration fluid to the compressor;

a suction line valve provided in the suction line to the compressor,

the suction line valve being operable between open and closed positions to cyclically allow and prevent flow of refrigeration fluid into the compressor,

the suction line valve in the closed position in normal operation preventing refrigeration fluid flow to the compressor other than optionally

other than optionally permitting a limited flow through the suction line valve to prevent vacuum pump operation,

a controller for actuating the suction line valve between the open and closed positions,

the controller being operative to cycle the suction line valve such that its cycle time is shorter than the response time of the system to modulate compressor capacity.

Supporting Language in the Specification

See Figure; Column 1, line 65 to Column 2, line 48

See the Figure; Column 2, lines 32-37

See valve 54 in the Figure

See Column 2, lines 32-45

Column 2, lines 32-37

See Column 2, lines 46-48

See Figure; Column 2, lines 22-25

See Column 1, lines 32-35

Attachment B (cont.)

Claim Language

Claim 33. A method of modulating the capacity of a compressor in an air conditioning or refrigeration system

comprising cycling a suction line valve, in fluid communication with the compressor,

using a cycle time shorter than the response time of the system to modulate compressor capacity,

the suction line valve being operable between open and closed positions to cyclically allow and prevent flow of refrigeration fluid into the compressor,

the suction line valve in the closed position in normal operation preventing refrigeration fluid flow to the compression chamber

other than optionally permitting a limited refrigeration fluid flow through the suction line valve to prevent vacuum pump operation.

Supporting Language in the Specification

See Figure; Abstract;
Column 1, line 65 to Column 2, line 48

See valve 54 in the Figure; Column 1, lines 25-27

See Column 1, lines 32-25

See Column 2, lines 32-45

See Column 2, lines 32-37

See Column 2, lines 46-48

Attachment B (cont.)

Claim Language

Claim 35. A method of modulating the capacity of a compressor in a closed refrigerant circulating system
said compressor comprising a compression chamber in fluid communication with a refrigerant suction line of the system through which refrigerant fluid is supplied to the compression chamber, comprising:
rapidly cycling a solenoid valve,
disposed in the refrigerant suction line upstream of said compression chamber
between its fully open position and its fully closed position to modulate compressor capacity,
the solenoid valve in the closed position in normal operation preventing refrigeration fluid flow to the compression chamber
other than optionally permitting a limited refrigeration fluid flow through the solenoid valve to prevent vacuum pump operation

Supporting Language in the Specification

See Figure; Column 1, line 65 to Column 2, line 48

See Column 1, lines 25-26

See valve 54 in the Figure; Column 1, lines 27-30

See Column 1, lines 25-27

See Column 2, lines 32-37

See Column 2, lines 46-48

Attachment B (cont.)

FORM PTO-1449 (Rev. 2-32)	U.S. Department of Commerce Patent and Trademark Office		Atty. Docket No. 011670.00006	Serial No. 09/921,334
			Applicant: Lifson, A.	
			Filing Date: 8/03/01	Group: 3744

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**

(Use several sheets if necessary)

U.S. PATENT DOCUMENTS

Examiner Initial	Document Number							MM/DD/YY Date	Name	Class	Subclass	Filing Date if Appropriate
<i>mw</i>	5	7	4	1	1	2	0	04/21/98	Bass et al			
<i>mw</i>	6	3	9	3	8	5	2	05/28/02	Pham et al			
<i>mw</i>	6	4	3	8	9	7	4	08/27/02	Pham et al			
<i>mw</i>	6	4	0	8	6	3	5	06/25/02	Pham et al			
<i>mw</i>	6	0	4	7	5	5	7	04/11/00	Pham et al			

FOREIGN PATENT DOCUMENTS

Document Number	Date	Country	Class	Subclass	Translation	
					Yes	No

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc).

EXAMINER <i>Marie Norman</i>	DATE CONSIDERED <i>12/3/03</i>
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EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication

Attachment C